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DIET AND NUTRITION

MAX EINHORN

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Medical and Surgical
JOURNAL

**PRACTICAL PROBLEMS
OF
DIET AND NUTRITION**

**BY
MAX EINHORN, M.D.**

**Professor of Medicine at the New York Postgraduate Medical School
and Hospital and Visiting Physician to the German
Hospital, New York.**

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PREFACE.

The knowledge of nutrition and diet should be the A B C of the physiologist and physician. Without it no rational treatment of any disease is possible. With a full understanding of it many states of invalidism can be greatly ameliorated or completely cured.

On several occasions I have written papers dealing with important questions relating to diet. In these, some general known principles in connection with experience of my own of practical value have been discussed in detail. In all of them special stress was laid upon the great importance of sufficient nutrition.

Feeling convinced that these papers on diet will be of material aid to the practitioner in the treatment of disease—and appreciating also that such articles, even if once read in the medical journals, are quickly forgotten—I have decided to collect them in the form of a monograph. It is my sincere hope that this booklet will prove of some service to the medical profession in promulgating the paramount importance of a sufficient nutrition.

MAX EINHORN.

NEW YORK, March, 1905.

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PRACTICAL PROBLEMS OF DIET AND NUTRITION.

I.

THE ART OF EATING PROPERLY (EUPHAGIA) AND THE HARM OF EATING TOO RAP- IDLY AND TOO SLOWLY (TACHY- PHAGIA AND BRADYPHAGIA).¹

EATING or partaking of food is our principal means of sustaining life. Without this the organism cannot thrive, cannot gain in weight (grow), and can exist only a short while. During the time of total abstinence the body lives on its own substance, steadily losing in weight, and soon dies. It will therefore not be out of place to devote our attention to this subject.

In the animal kingdom, as well as also among uncivilized peoples, the obtaining and taking of food forms the principal occupation during life. The necessity of obtaining food has remained the same with civilized man, but the manner of partaking of it has been changed partially to his disadvantage. New interests have arisen, and the act of eating has been partially relegated to the background. Many busy persons scarcely take time to eat; they swallow hastily any kind of food without spe-

¹ M. Einhorn: Medical Record, January 7th, 1905.

cial selection, at times poorly prepared. The natural consequence of this is that under these conditions diseases of the digestive system develop quite frequently.

I may be permitted to describe first in a few words the art of eating properly (*euphagia*), and then discuss two improper modes of eating (*tachyphagia* and *bradyphagia*).

Euphagia.—Like all natural processes, the partaking of food, if done in a correct manner, affords the body pleasure and satisfaction. For this purpose, however, the organism must be prepared by previous work and subsequent rest. Already in the Bible the following statement is found: “In the sweat of thy brow shalt thou eat bread.” This shows the importance of work on eating. A similar proverb exists in the German language, “Arbeit macht das Leben süß” (Work sweetens life), which sentence naturally refers not only to eating, but to all functions of life. Granted, however, that work is necessary, yet it must not be in excess or lead to exhaustion, as in this condition the appetite usually disappears and digestion becomes sluggish.

Meals are best taken during those periods when the body is at rest. The time for taking food must not be too short. During the meal it is better not to think of business, or serious or perhaps even sad things. Our whole and undivided attention should be given to our meals. Pleasant company, light conversation, jokes, and stories add to the enjoyment of food.

It is generally known what a powerful influence the brain exerts over our digestive faculties. Great grief robs us of our appetite and may cause real disturbances of digestion. Pawlow has lately established the physiological importance of the mental state on digestion, hav-

ing shown, for instance, that delicacies produce secretion of gastric juice as soon as they are perceived by the eye, even before they are eaten.

The food must not only be palatable, but must be served in an attractive manner (fine dishes, table decorations, etc.).

In eating we must take time to chew our food thoroughly. This serves a double purpose: (1) through the act of mastication the coarser particles of food are broken up; (2) more saliva is secreted and is thoroughly mixed with the food. The digestion of starch is thus materially aided, and the proteids are made more easily accessible to the action of the gastric juice.

Water should accompany each meal. It increases the appetite and the enjoyment of food. It also serves a useful purpose when substances are taken into the mouth or even swallowed too hot. A mouthful of cold water will at once lower the temperature and obviate any danger of burning.

After eating we should rest a little while before returning to our work.

Tachyphagia, or hasty eating, is a common evil. The food is only half masticated, or not at all, and enters the stomach without being properly insalivated and comminuted. It is easily seen that thus the foundation for many a stomach or bowel ailment is laid. The coarse food causes too much irritation to the gastric mucous membrane, and it is not sufficiently acted upon by the gastric juice, which usually only affects the external surface, leaving the rest unchanged. This refers particularly to the digestion of albuminoids. Starch, however, under these conditions is also left without any alteration, because the ptyalin of the saliva is not present in sufficient quantity. The chyme, therefore, reaches the bowel

practically unchanged, causing here almost a state of irritation. Besides the mechanical effect, however, tachyphagia has other drawbacks, because it encourages the taking of large quantities of food in too short a time, and the consumption of foods too hot or too cold. In eating correctly a predeovision is made that not too much food passes into the stomach at once, for mastication requires time; besides there is some time spent in conversation and in serving the different courses. The temperature of food and drink is partially equalized by the slow passage through the mouth and oesophagus. All these factors are absent in eating too rapidly, and we thus have the two obnoxious points spoken of above, viz., unsuitable quantity of food and unsuitable temperature—two conditions that often cause digestive disturbances.

Clinically the disadvantages of tachyphagia are so well known that it does not seem necessary to illustrate them by means of examples. Every physician has observed cases of gastric and intestinal catarrh, hyperchlorhydria, and other tedious digestive disturbances, the etiological factors of which could be found in the existing tachyphagia.

Bradyphagia.—By bradyphagia (eating too slowly) we understand a condition in which eating is performed abnormally slowly, so that the organism is thereby injured.

In general, we as physicians will more often have to battle against the above-described tachyphagia, advocating a properly slow or, more correctly, a rational mode of eating. This, however, may be, and is, indeed, overdone by some persons to their detriment. In such cases every morsel is masticated and remasticated, and before being swallowed is again chewed and everything carefully

tested with the tongue, whether it has been thoroughly comminuted. An abnormal fear and suspicion develop in this manner, and for such a person eating is a difficult task. The enjoyment and pleasure of eating are transformed into a doleful process, and thus frequently a smaller quantity of food is taken than usual. Not rarely it happens that the bolus occasionally remains in the pharynx or cesophagus and refuses to budge. It is not an organic affection that causes this variety of dysphagia, but merely the excitement and fear of eating. In these cases, in course of time, a chronic inanition develops, owing to bradyphagia and the added temporary dysphagia, in consequence of which the patient gradually becomes weaker and occasionally dies, unless we combat the evil energetically at once.

Since bradyphagia is of comparatively rare occurrence, I do not hesitate to give a few examples.

CASE I.—April 2d, 1896. G. I. L., 32 years old, lawyer, has suffered for the last five or six years from digestive disturbances. He has lost considerable flesh, and has been unable for the last three years to attend to business. He complains of his inability to swallow food and of intense pains in the upper abdominal region, particularly after meals. He has lost in all about forty pounds, of which the smallest quantity in proportion was lost during the last six months. He adheres to a strict diet and eats very slowly, taking a half-hour to consume a glass of milk.

Status præsens: The whole body is emaciated; examination of the thoracic organs gives negative results; the stomach extends to about two fingers' width below the navel. The epigastrium is slightly sensitive to pressure. One hour after test breakfast the stomach contents showed the presence of free HCl and an acidity of 78. The swal-

lowing sound occurred seven seconds after the drinking of water.

In the absence of any organic lesion the diagnosis of neurasthenia and hyperchlorhydria was made. The difficulty in eating was explained by the psychic excitement subsequent to the sitophobia and bradyphagia. The patient was put upon a more liberal diet and advised to eat more quickly. In three weeks he gained eleven pounds; he continued to gain in weight and recovered entirely.

CASE II.—March 23d, 1903. Mrs. R. F., about 35 years old, has been suffering from digestive disturbances for the last three years. She claims to have pains in the epigastrium after every meal, and suffers much from belching, constipation, and lack of sleep. She is much run down and has been unable for the last two years to look after her household duties. She says that she eats only the lightest foods (principally liquid diet) with the greatest care, requiring twenty minutes for the ingestion of half a plate of soup and twenty-five minutes for a cup of milk. Owing to these extreme precautions, she is obliged to take her meals alone. She is surprised that in spite of all this she does not improve. The diagnosis of neurasthenia, hyperæsthesia of the stomach, and bradyphagia was made. The patient was told to eat a variety of plain and simple foods, and to eat and drink more rapidly. In two or three months she had completely recovered. She ate with the rest of the family and was again able to attend to her household duties.

Treatment of Faulty Eating (Tachyphagia and Bradyphagia).—All persons who eat too fast should be warned by their physicians. They should be told to take more time for their meals and to chew their food thoroughly. If the time for eating is occasionally too short, as in

railroad journeys, etc., it is better to omit the meal or to take only something fluid (a glass of milk, a raw egg, or some beef-tea).

To combat bradyphagia—observed in neurasthenies, and only rarely even in them—we must take active measures, as it is impossible to cure them as long as this condition exists, owing to the too small quantity of food ingested. They should be told to eat more, and more rapidly, and not to take too small bites or to chew too long. Fluids must be taken in larger quantities (not teaspoonfuls at a time). They should not take their meals apart from the rest of the family, but should eat at the common table and finish at the same time as the others.

Frequently these instructions alone will be sufficient to correct this fault. If, however, this is not the case, then we must take refuge for a time in sedative drugs (bromides, valerian, etc.), in order to allay the psychic excitement during the time of eating. If the patient, with the aid of these drugs, has accustomed himself to take a few meals in a correct manner without suffering, he will then usually have enough confidence in himself with regard to his ability and will get along without medicines. The removal of bradyphagia will frequently smooth the path to convalescence and enable the patient to get entirely well.

II.

DIETETICS IN DISEASES OF THE STOMACH AND INTESTINES.¹

DIETETICS, or the doctrine of nourishment, has taken an important part in the treatment of the sick ever since the time of Hippocrates; but, although the dietetics of the diseases accompanied by fever has not changed much in its chief points, new rules and principles regarding nutrition in chronic diseases have been introduced of late. This has reference especially to diseases of the stomach, that branch of internal medicine which in the last two decades has shown so much unlooked-for progress. As the therapeusis of diseases of the stomach has to deal with dietetics principally, I thought it would be of interest to discuss this subject before you. It will be expedient to divide the subject of diet in gastric affections into three parts:

1. General rules of diet in diseases of the stomach.
2. Dietetics in acute diseases of the stomach.
3. Dietetics in chronic diseases of the stomach.

1. General Rules of Diet in Diseases of the Stomach.

—Within the past two years important facts have been discovered which are of the greatest value in the treatment of diseases of the stomach, and the influence of which can be perceived like a red thread through the whole chapter of dietetics. It has been shown by von

¹ Read before the Medical Society of the County of New York, May 22d, 1893. Medical Record, June 24th, 1893.

Noorden¹ and others that emaciation in chronic diseases of the stomach is caused in the largest majority of cases—if, perhaps, not in all—not by specific poisons circulating in the organism, but by a smaller amount of food being taken. On the other hand, one might expect, judging from the universal law existing in the plant and animal kingdom of vicariousness or replacement in case of inability of the work of one organ by another similar one, that, in grave disturbances of the digestive functions of the stomach, the intestines would do the work instead. This has been experimentally, as well as clinically, proven in the most positive way. Several authors (Leube, Ewald, von Noorden) have observed that in cases of atrophy of the mucous membrane of the stomach, in which, as you all know, the gastric secretion has entirely ceased, the patients can maintain their usual weight. From my paper on achylia gastrica² it is clearly seen that patients can do very well without gastric secretion; under a proper regimen they can even gain in weight and live long without any discomfort whatever. This means that, even after the loss of the entire chemical action of the stomach, the gut is completely able to replace the function of the stomach.

These two facts—(1) that the emaciation in chronic diseases of the stomach is caused by too small a quantity of food; (2) that even in grave lesions of the gastric functions the gut appears to perform vicariously the digestive work in a complete way—are of vital importance for the doctrine of dietetics. For it is seen at a glance that the main object of nutrition of the sick consists in giving them sufficient quantities of food.

Before proceeding it is necessary to review briefly the

¹ Von Noorden: *Berliner Klinik*, Heft 55.

² Max Einhorn: *Medical Record*, 1892.

normal physiological nutrition of man. We perceive at once that there is a great variety in the diet of healthy persons with regard to the quantity as well as the different food substances. Nevertheless, they all contain the three groups of food-stuffs—albumins, carbohydrates, and fats. Thus, for instance, vegetarians live and thrive principally on vegetables; the Esquimaux, on the other hand, almost exclusively on animal diet. The golden path, however, lies in the middle, and all authors (Voit, Pettenkofer, Hoffmann, Forster, and Gruber) recommend a combination of animal and vegetable food. R. Virchow, likewise, is of the same opinion, and expresses himself regarding this question as follows: "Although the Kirghez and the Esquimaux show us that health and life can exist through many generations on an exclusively nitrogenous diet—other tribes (Hindoos) live principally on non-nitrogenous food—still history shows us that the highest attainments of the human race have emanated from nations who have lived and live on mixed diet."

A mixed diet, taken partly from the vegetable and partly from the animal kingdom, is the most suitable form of nourishment. We obtain the greatest amount of carbohydrates from the vegetable kingdom, while a great deal of the albumin is derived from animal food. The relation between animal and plant albumin, according to Munk and Ufflemann,¹ should not be less than three to seven. As regards the quantity of food, according to the same authors, an adult doing a medium amount of work requires daily 118 gm. albumin, 56 gm. fat, and 500 gm. carbohydrates.

Food only to a small extent serves the purpose of re-

¹ Munk and Ufflemann: "Die Ernährung des gesunden und kranken Menschen," Wien, 1887.

constructing tissue waste; in its largest part, however, it is utilized for generating the heat requisite for the maintenance of life. For that reason it is customary to speak of the necessary amount of heat-units during twenty-four hours instead of the quantity of food. By "heat-unit" is meant, as is well known, that quantity of heat which is required to raise the temperature of 1 gm. of water one degree Celsius. "Great heat-unit" means the amount of heat required for warming 1,000 gm. of water one degree Celsius. Each kind of food is ultimately oxidized in the body into its end-products, and is in greatest part exhaled in the form of carbonic acid; the more carbon atoms a food-stuff contains the more heat-units it will generate. In speaking of the heat value of food, the great heat-units are used, the term "great," however, being omitted. Thus 1 gm. of albumin generates 4.1, 1 gm. of fat 9.3, and 1 gm. of carbohydrate 4.1 heat-units. If we know the quantity of nourishment taken, the amount of the introduced heat-units is easily determined by multiplying the different food-stuffs by the above given figures. The daily amount of heat generated by the body, or necessary for the maintenance of the same, has been approximately estimated at 2,500 heat-units.¹ The heat value of the food taken by an average working person amounts, according to von Noorden,² to about forty heat-units when working, and when resting to about thirty-four heat-units per kilo a day. According to K. Vierordt,³ an adult takes in form of food a daily average of 120 gm. albumin, 90 gm. fat, 330 gm. carbo-

¹ Koenig: "Die menschlichen Nahrungs- und Genussmittel," Berlin, 1883, p. 53.

² Von Noorden: *Berliner Klinik*, Heft 55.

³ K. Vierordt: "Grundriss der Physiologie des Menschen," 1887, 3. Auflage, pp. 288, 289.

hydrate (the relation of the nitrogenous food-stuffs to the non-nitrogenous being 1 to 4), and 2,818 gm. of water. The above-mentioned figures differ from those given by F. Hirschfeld.¹ This author demands 80 gm. of albumin as the lowest amount contained in a sufficient diet. Victuals are composed mostly of all the three food groups (albumin, carbohydrate, fat) and water, and contain in minute amounts the inorganic salts found in the body.

I give here a small table (see page 13), showing the percentage of the three food groups ordinarily contained in most every-day victuals.

In order to have a correct idea of my own about the quantity of nourishment consumed daily, I have weighed and recorded for two successive days all the victuals and drinks taken by my wife and myself. The record showed that I had taken during the first test-day 63.8 of albumin, 47.3 of fat, and 168.8 of carbohydrate; the total number of heat-units was 1,402.3. During the second test-day the corresponding figures were somewhat higher; the quantity of albumin was 79.39, fat, 54.3, carbohydrate, 263.9; the total of heat-units equalled 1,912.5.

The average figure of heat-units per day was $\frac{1402 + 1912.5}{2} = 1,657.4$. As my weight is 52 kilos, the amount of heat introduced into the system per kilo and per day was $\frac{1657.4}{52} = 32.3$.

My wife partook during the first test-day 103.19 of albumin, 44.99 of fat, and 204.64 of carbohydrate. The total of heat-units was 1,660.5. On the succeeding day the figures were as follows: 64.03 of albumin, 31.14 of fat, 174.92 of carbohydrate. The total of heat-units was 1,269.29. The average figure of heat-units per day was $\frac{1660.50 + 1,269.29}{2} = 1,464.89$.

¹ F. Hirschfeld: Berliner klin. Wochenschr., 1893, No. 14.

COMPOSITION OF THE MOST COMMON FOOD SUBSTANCES.¹

	Albumin.	Fat.	Carbohydrate.
	Per cent.	Per cent.	Per cent.
Cow's milk.....	4.0 to 4.3	3.0 to 3.8	3.7
Butter.....	16	90.0	16
Milk-soup with wheat flour.....	5.0	3.25	15.0
Whey (sweet).....	0.5	0.3	3.6
Buttermilk.....	3.0	1.3	3.0
Kumyss (of cow's milk).....	3.35	2.07	{ 0.7 lactic acid 1.9 alcohol 0.8 carbonic acid
Cheese (cream).....	25.0	30.0	3.0
Cheese.....	33.0	9.0	5.0
Beef (lean).....	18.0	2.0	1.0
Veal.....	15.5	1.0	..
Sweetbread.....	22.0	0.4	..
Poultry.....	22.0	1.0	..
Game.....	23.0	1.0	..
Meat-broth (ordinary).....	0.4	0.6	..
Meat-juice (pressed).....	6.0 to 7.0	0.5	..
Beef-tea.....	0.5	0.5	..
Leube's solution.....	{ 9.0 to 11.0 albumin + 1.79 to 6.5 pepton		
Oysters.....	4.95	0.37	..
Egg.....	12 ¹ / ₂	12.0	16
Sago.....	0.5	traces	86.5
Malt extract.....	8.0 to 10.0		55.0
Barley-soup.....	1.5	1.0	11.0
Rice pap with milk.....	8.8	3.5	28.6
Wheat flour.....	8 ¹ / ₂	14	73.0
Rye flour.....	10.0	2.0	69.0
Wheaten bread.....	6.0	34	52.0
Rye bread.....	4 ¹ / ₂	1.0	46.0
Roll.....	6.82	0.77	43.72
Zwieback.....	9.5	1.0	75.0
Cauliflower.....	2.0 to 5.0	0.4	4.0
Asparagus.....	2.0	0.3	2.5
Rice.....	5 ¹ / ₂	14	76.0
Beans.....	19 ¹ / ₂	2.0	52.0
Peas.....	19 ¹ / ₂	2.0	54.0
Potatoes.....	1 ¹ / ₂	..	20.0
Oatmeal.....	12.5	5.26	66.77
Barley-meal.....	8.31	0.81	75.19
Pulverized meat.....	64.5	5.24	2.28
Pike.....	18 ¹ / ₂	16	34
Salt herring.....	19 ¹ / ₂	17.0	16
Caviare.....	28.4	16.26	7.82
Spinach.....	3.49	0.58	4.44
Coffee.....	3.12	5.18	..
Tea.....	12.38		
Pickles.....	1.2	0.09	0.95
Meat-broth.....	0.4	0.8	..
Beer.....	0.5	5.25	0.3
Porter.....	0.7	6.0	0.3

¹ Taken from Koenig, *loc. cit.*, and principally from Munk and Ufflemann, *loc. cit.*

As my wife weighs 55 kilos, the amount of heat-units per kilo and per day was therefore $\frac{1464.89}{55} = 26.63$.

My wife, as well as myself, hold our weight, live regularly, and the food taken is not subject to very great differences; therefore, the figures mentioned may be considered as our average ones. These figures, however, are far smaller than the average given by all authors. This shows what great differences there are in the quantity of food taken by people in their normal condition in order to make up the daily loss. The one maintains his balance at a rate of 26 heat-units per kilo a day; the other may lose in weight at 30 heat-units per kilo a day. The scale is the best guide as to whether a certain amount of food is sufficient or not. It shows quickly and with certainty whether the organism maintains its balance or not.

After this lengthy dissertation on the diet in health, let us return to the sick.

As people with disturbances of the stomach have to replace for their existence no smaller losses than under physiological conditions, they will therefore need: 1. Just as large amounts. 2. The same kinds of food-stuffs as described for the normal state. The only difference possible will have reference to the selection of the various articles of diet and to their form and special preparation.

Thus the question arises, What qualities should the food of stomach patients possess?

In the treatment of a diseased organ one can often make use of two methods. One consists in sparing the diseased organ and giving it perfect rest; the other consists in strengthening the same by methodical adaptation for more work and practice. Both principles are, in fact, realized in the treatment of diseases of the stomach.

The first method is ordinarily applied in acute diseases, and only very seldom (and then only for a short time) in chronic affections of the stomach. In the latter the second principle, as a rule, is used. The stomach can be spared, firstly, by not introducing into it any food whatever (greatest degree of saving or rest). Secondly, by administering food substances which, during their stay in the stomach, do not impose much work upon this organ, and do not greatly irritate it. Here the main object will be to give the patient easily digestible food. In turning from the saving principle to that of strengthening the organ by methodical adaptation for work, it will be quite natural to change the diet, not suddenly, but gradually, into such as requires more work on the part of the stomach for the digestion. It is therefore absolutely necessary to have an exact table of the digestibility of different foods. In prescribing or changing a diet we shall have to act according to it. Such a scale has been arranged by different authors. The main sign of digestibility was gauged by the rapidity with which the various food-stuffs passed out of the stomach into the intestines. Beaumont, in many trials on his patient with the gastric fistula, determined the length of time the different victuals remained in the stomach, and constructed a scale according to the figures obtained. On the same principle, but more reliable and of greater value, is the scale constructed by Leube, according to the results obtained by emptying the stomach by means of the tube, after different kinds of food had been taken. We think it advisable and useful here to give Leube's scale:

1. *Diet.*—Bouillon, Leube-Rosenthal's meat solution, milk, soft-boiled eggs, zwieback, English cakes (biscuits

containing no sugar), water, natural acidulous waters (Apollinaris, Kronthaler, Seltzer, etc.).

2. *Diet*.—Boiled calf's brain, boiled calf's sweetbread, boiled chicken (young without the skin), boiled pigeon, boiled calves' feet, tapioca pap boiled in milk, beaten white of egg.

3. *Diet*.—Raw beef (chopped very fine), raw ham (chopped very fine), beefsteak (superficially fried in freshest butter), finely scraped tenderloin of beef, mashed potatoes, white bread (stale), coffee with milk, tea with milk.

4. *Diet*.—Fried chicken, fried squab, roast venison, guinea hen, roast beef (cold), roast veal (leg, saddle), boiled pike, macaroni, rice pap, finely chopped spinach, asparagus, stewed apples.

These tables, however, have not as yet, on the one hand, been fully verified on healthy individuals or found always alike (giving the same results); on the other hand, such experiments only show what food remains in the stomach the shortest time. This would perhaps give reason for assuming what food may be easily digested as far as the stomach is concerned, but not what is most easily digested as a whole, *i.e.*, utilized for the economy with the smallest amount of work. The digestibility of food substances depends, first, upon their shape and quality; secondly, upon their percentage of convertible material.

“*Corpora non agunt nisi fluida*,” is an old, well-known axiom. Following this law one could arrange the following scale of digestibility, which is constructed according to the different physical conditions of the food:

1. In the first place, food in liquid form: (a) Liquid at ordinary temperature — milk, meat-juice, beef-tea,

bouillon, peptone or sarcopeptone dissolved in water, bread-water,¹ strained barley, oatmeal, rice-water, strained oyster-soup, egg albumin-water; (b) liquid at the body temperature—jellies, fruit-jelly, calf's-foot jelly, ice-cream, water-ice.

2. Pulpy form: The food is mechanically converted into very minute particles and well mixed in liquid—pap soups (barley, oatmeal, farina, rice, sago); egg in bouillon; Leube's meat solution, pulverized meat, pulverized crackers in milk, water, or bouillon; buttermilk; kumyss; cream; butter.

3. Food which by slight trituration in fluids separates into minute particles: White bread in milk or water; the tips of well-boiled asparagus; carrots; mashed potatoes, baked potatoes; the yolk of hard-boiled eggs; oysters (raw).

4. Solid food: White bread, rye bread; meat, hard-boiled eggs, fish, cheese.

5. Substances not easily digested: Meat with tough fibre; lobster; sausages and Swiss cheese on account of their solidity; all substances containing much cellulose, particularly when eaten raw; cole-slaw; all salads, cucumbers, pickles, raw fruit, apples, pears, pineapple; fruit which contains much acid, therefore all unripe fruit, strawberries; substances containing much sulphur and forming gases in the intestines; all kinds of cabbage, principally white cabbage; beans.

This theoretically constructed scale of the digestibility of food is, at the same time, in the main points, similar to the one which has long stood the test of empiricism and which I ordinarily apply in my practice.

¹ Bread-water. Stale bread is cut into slices and put in water at temperature of room for from two to three hours, then the water is strained.

After these general explanations we return to our special subject.

Dietetics in Acute Diseases of the Stomach.—The principle of rest here occupies the first place. In acute gastric catarrh one gives, during the first two or three days, in which, usually, there is a total loss of appetite, only very little nourishment in liquid form, containing principally amylacea, barley or oatmeal soup, bouillon, weak tea, water. As a rule, one must not force a patient to take food during the first or even during the second day of sickness. The anorexia in these conditions is a wise arrangement made by nature in order to give the stomach rest. If there is thirst, beverages may be taken in small quantities, and must be neither very cold nor very warm. As soon as the appetite reappears one may give some toasted bread or zwieback, milk, soft-boiled eggs, or oysters, permitting, after a while, small quantities of bread and meat, and then passing slowly to the ordinary diet.

Ulcer of the Stomach.—During the rest cure of von Ziemssen-Leube give liquid diet, consisting principally of milk, for two or three weeks. As is well known, Cruveilhier¹ first recommended milk for this purpose, and even now there are some physicians who limit themselves to milk alone. As a rule, however, it is appropriate to allow, besides milk, milk in combination with barley, oatmeal, or rice-water. In addition to this, the different peptone preparations are here in place. I administer Rudisch's sarcopeptone, manufactured in this country, on account of its being palatable and highly nourishing. (The Rudisch's sarcopeptone contains forty per cent of nitrogenous substances, including twenty per cent of peptones.)

¹ "Anatomic Pathol.," 1829-35.

One may give most appropriately every three hours one to two cupfuls of milk with or without the addition of the above-named decoctions (four times daily) and sarcopeptone (twice daily). The patient must not drink these fluids, but eat them with a spoon. In case of hemorrhage from the stomach, during the first three or four days it is not permitted to give any food whatever by the mouth; instead, the patient must be fed by the rectum. Ewald has proven that the large intestine has the ability of digesting and absorbing albuminates even without special previous preparation; therefore the following may be given as a nutritive enema:

1. Three to five eggs are mixed with 150 c.c. of sugar-water (30 gm. of grape-sugar dissolved in 150 c.c. of water), a small quantity of common table-salt is added, and the whole mixture well beaten; one may add also a small quantity of starch solution or mucilage.
2. One-half pint of milk + 2 eggs + 50 gm. of grape-sugar.
3. One-half tablespoonful of Rudisch's sarcopeptone or plasmon dissolved in a cupful of water.

The food enemata have to be given three or four times daily. It is necessary that the fluid should be at the temperature of the blood, and that it should be injected by means of a fountain syringe and a soft-rubber rectal tube. Every morning a cleansing enema of one quart of saline should be given, in order thoroughly to cleanse the large intestine and make it more fit for absorption. In case of thirst the patient is allowed to take small pieces of ice into the mouth from time to time. Three days after the disappearance of blood one slowly and cautiously begins the liquid diet.

Dietetics in Chronic Affections of the Stomach.—While in acute diseases of the stomach we paid most attention

to giving rest to the organ—for here even an insufficient nutrition and the loss of several pounds of bodily weight is not of much importance, as the quickly recuperating organism replaces the losses caused during the sickness by taking increased quantities of food—in the chronic affections it is of utmost and vital importance to see that sufficient quantities of food are taken.

The greatest number of stomach patients consulting the physician, after the disease has been progressing quite a while, have lost more or less weight. The principal reason for this lies in the fact that the body has received too small a quantity of nourishment in order to replace the waste.

The ordinarily insufficient appetite, the early appearance of a feeling of satiation, the pain often appearing after meals, and less frequently vomiting, are the principal factors of subnutrition.

At this point it becomes necessary to divide patients with stomach troubles into two large classes:

1. Those with organic lesions of the stomach. 2. Those with functional disturbances.

The first class comprises (a) the malignant diseases of the stomach itself or its orifices (carcinoma ventriculi, cardiae, pylori); (b) cicatricial strictures of the cardia or pylorus; (c) absence of secretory work of the stomach: achylia gastrica.

In this whole first class, with the only exception of group *c*, which lies, so to speak, between the first and the second class, we are unable to accomplish much either by treatment or dietetics. In existing strictures of the cardia or pylorus one will be obliged to seek surgical aid. Even in cancer of the stomach-wall the resection of the affected part is advisable whenever the operation is possible. I cannot abstain from calling attention at this

place to the splendid results of the recent stomach surgery, which of late has been frequently practised in our own country (F. Lange, N. Senn, R. Abbe, Willy Meyer, McBurney, Weir, Murphy, McGraw, Mayo, Bull, Marckoe, Syms, and others). In carcinomatous strictures a new passage can be established, either for bringing food into the stomach by a gastric fistula, or for allowing it to pass into the intestines by gastro-enterostomy. In this way one succeeds at least in temporarily giving these unfortunate ones relief and in ameliorating their nutritive condition. In the cicatricial strictures one is warranted in promising to the patients, nowadays, perfect recovery if they will submit to operative treatment. (In stricture of the cardia a methodical dilatation of same with bougies may sometimes also suffice.) The pyloro-plastic operation (of Heincke-Mikulicz) and the cardiotomy or cardio-fissure (Abbe) belong to the most beautiful and beneficent operations which have ever been practised. After the operation the patients are enabled to eat everything and to live without any trouble whatever, *i.e.*, they are perfectly cured.

Before the operation, or if such is not feasible, one will administer light, very slightly irritating nourishment, and always endeavor to make the patient partake of a larger quantity of food. If there is obstinate and constant vomiting, it is necessary to employ nutritive enemata.

Group *c*, achylia gastrica, will be advantageously discussed in regard to diet under Class 2.

The second class of functional disturbances includes the largest number of all dyspeptics. Here stand uppermost chronic gastric catarrh, atony of the stomach, dilatation of the stomach, gastrophtosis, superacidity, with or without hypersecretion, nervous gastralgia, ner-

vous dyspepsia, and, as an intermediary between the first and the second class, achylia gastrica.

It appears advisable to discuss first the whole class, and thereafter to give special rules for the different groups. Liquid food or partly predigested substances (as all peptone preparations) are not in place here. By making the stomach work too little, the weakened condition of this organ is retained and aggravated in time. We must always bear in mind the principle of strengthening the organ by means of appropriate work.

Delafield¹ is said to express himself in his lectures in the following way regarding the dietetics of the dyspeptic:

When a dyspeptic patient asks you the question, "What shall I eat?" reply, "Eat what you like." If he asks, "How much shall I eat?" say to him, "Eat as much as your appetite demands." If he still asks, "When shall I eat?" answer, "Eat when you are hungry."

Although I do not favor strict and severe dietetic rules, nevertheless I deem the above-mentioned remarks as going too far. Unlike the normal healthy condition, in which instinct shows us the right measure to eat, neither too little nor too much, stomach patients very often have lost the feeling of self-regulation, and as a rule partake of too small quantities of food. (Only in a few cases of boulimia there may be an increased desire for food, and in connection with it the quantity of nourishment taken may sometimes be too large.) It is therefore necessary to instruct the patients to eat more, or to give them exact figures of the quantity of food required. As this varies with every individual, it is most practicable

¹ Cited from Kellogg: "Methods of Precision in Disorders of Digestion," 1893, p. 4.

to let the patient weigh himself once a week and to see whether he keeps his weight. If the patient does not lose any it is the best sign that he takes sufficient nourishment. Besides, we must remind patients to lead a regular life, to eat slowly (how many, especially in our country, sin against this natural law), and to chew well and triturate the food. One must avoid either extremely cold or extremely warm food. Too copious and too complicated meals must be strongly forbidden.

I have made it a rule not to forbid anything, except what is, according to my conviction, obnoxious in the given case. In this way the patients have a great variety in their food and run less risk of subnutrition. Likewise we need not change the number of meals nor the hours appointed unless there should be special indications for such a proceeding.

Among the laity, as well as often among medical men, there are prejudices against certain forms of food. Thus, for instance, until recently one forbade all kinds of fat, even butter, in all dyspeptic conditions. Fat, however, belongs to the group of food-stuffs which has the largest number of heat-units, and, besides, is not bulky as a nourishment (butter). Undecomposed fat passes the stomach without molesting the same, and is digested in the small intestine. There is, therefore, no reason for forbidding butter, which should, on the contrary, be highly recommended. Fearing fermentative processes the partaking of bread and other food rich in carbohydrates is very often greatly limited or even totally forbidden. Although it is true that the carbohydrates easily undergo fermentative processes, yet those cases in which considerable fermentation exists in the stomach are quite rare, and as a rule are found only where there is considerable stagnation of food in the stomach. In

these cases, to be certain, a diet consisting principally of animal albumin (meat) for a short period is very useful. By means of lavage of the stomach and other appropriate treatment one soon succeeds in checking the fermentative processes, and one can then administer carbohydrates.

An adult, according to Koenig,¹ daily consumes one-third to three-fourths kilo of bread; fifty to sixty per cent of the total food substances, and fifty to seventy-five per cent of the carbohydrates are taken in the form of bread. This clearly shows the important part bread plays in diet. Its use is, therefore, as a rule advisable. It is ordinarily said that crust of bread, stale bread, and zwieback are easier to digest, on account of the starch contained in them being largely converted into dextrose. Although I am of the opinion that too fresh bread must be avoided, I nevertheless rarely find much difference in the digestibility of the crust or other parts of well-baked fine white bread, judging from experience gained from my own patients.

Articles of luxury (wine, beer, coffee, tea) are, as a rule, permissible. It is, however, necessary to give them in small amounts and in appropriate form. Strong liquors must be avoided, likewise all strong spices.

Appetizers, as a small amount of caviare, sardellen, or anchovies, on a small slice of bread or cracker, taken one-quarter of an hour before the meal, are not only allowed but frequently directly commendable.

In reference to the special rules for the different diseases of the second class, we shall have at times to reduce the quantity of meat taken in all conditions accompanied by a diminished secretion of HCl (gastritis chronica

¹ Koenig: "Die menschlichen Nahrungs- und Genussmittel," Berlin, 1883, p. 430.

glandularis, atony + sub acidity); on the other hand, the quantity of richly carbohydrate vegetable food will be increased. Kumyss, matzoon, milk with cognac (7 to 10 c.c. of cognac to 200 or 250 c.c. of milk) may be taken with crackers either during or between meals.

In all the conditions with superacidity the quantity of albuminous food should be increased; here one may give a great deal of meat (venison included). In superacidity with hypersecretion frequent and small meals containing consistent food are most appropriate. If there is a feeling of hunger between meals, the white part of hard-boiled eggs may be taken (as is well known, albumin combines with acid and makes it, so to say; inert). The quantity of beverages must be greatly limited; most suitable in this instance are small quantities of vichy water. In dilatation of the stomach and in gastrophtosis it is also advisable to give small and frequent meals and to restrict the quantity of liquids taken. As a rule, milk and beer do not agree well in these cases. Small quantities of wine or imported dark beer or porter may be allowed.

In nervous dyspepsia and gastralgia our main object will be systematically to increase the quantity of food—here milk and its derivatives (kumyss, matzoon, bonny clabber, buttermilk, cream), taken between meals, play a prominent part (Weir-Mitchell treatment).

In achylia gastrica it is of utmost importance to give at first liquid or very well-triturated (pulverized) food. For here the chemical action of the stomach has entirely ceased, and vegetable (on account of the albuminous membrane enclosing the starch granules) as well as animal foods pass from the stomach unchanged, and not converted into small particles, into the intestines and irritate them, unless there has long been formed a sufficient adaptation for these conditions. Vegetable food, on ac-

count of its containing chiefly carbohydrates, should predominate in the diet of this affection. Thus achylia gastrica, in reference to diet, stands midway between the first and second classes. It approximates to the first class in so far that it necessitates liquid or a mechanically minutely triturated or pulverized food, the second class in allowing a richly carbohydrate diet. After a short period of this diet, bread, gruels, soft-boiled eggs, cottage cheese may be added. Later on I usually allow also tender meats once daily.

Some readers may miss in my paper exact bills of fare for chronic affections of the stomach. They have been omitted, as it is always necessary to individualize, especially in diet. We must guide ourselves more by the patients than by theoretical conclusions. Our main object must be to care for a sufficient nutrition. Only the above-given principal rules on diet must be observed, although at times even they have to be modified. In reference to this point Hippocrates¹ said: "*Dandum aliquid tempori, regioni, aetati et consuetudini.*"

At present, with our more exact knowledge, we have come to appreciate this conclusion to a still greater degree.

The Diet in Diseases of the Intestines.—The general rules are the same as for the diseases of the stomach. Acute disturbances must be treated on the principle of rest, permitting only liquid and semi-liquid foods in small or moderate quantities. As a rule, everything should be served warm. In acute enteritis coffee, cold drinks, acid lemonades, and all fruit juices should be strictly forbidden. In acute appendicitis, intestinal obstruction, etc., either no food at all or very small quantities of liquid food (white-of-egg water, milk mixed with

¹ Cited from Munk and Uffleman, *l. c.*, p. 480.

strained gruels, bouillon, weak tea) should be administered.

In chronic affections of the intestines it will be necessary to provide for a sufficient nutrition. In organic affections (stricture, cancer of the intestines) an enterostomy should be performed, in order to allow adequate nutrition. But before this operation is undertaken, or if the latter be not feasible, liquid nourishment and small amounts of tender meat, also raw or very soft-boiled eggs with butter, will be permissible. Foods having considerable residues of undigested material must be forbidden.

In chronic enteritis and all functional disorders of the bowel, ample nutrition and training this organ to do its proper work should be the aim of treatment. In conditions accompanied by diarrhoea, fruits, salads, cold drinks, and highly spiced foods should be interdicted. Otherwise there should be no restrictions in the diet.

In affections of the bowel with constipation, the so-called "laxative" foods (fruits, salads, green vegetables, brown bread, whole-wheat bread, Boston brown bread, etc.) play an important part in the diet. The patient must be encouraged to eat ordinary foods and to partake liberally of the articles just mentioned.

III.

THE DIET OF DYSPEPTICS.¹

A FEW years ago I had the honor of reading a paper before this society, on "Dietetics in Diseases of the Stomach."² To-night I wish to discuss more fully a few points which are of eminently practical importance, and which I had at that time broached only superficially. The majority of dyspeptics, or of patients suffering from chronic digestive disorders, are affected with functional or nervous derangements. Most of these patients suffer either from loss of appetite or from gastralgia, sometimes from both, and hence take inappropriate and insufficient nourishment. Thus some live on small quantities of peptonized milk; others on artificial meat extracts (beef-juice, liquid peptonoids, etc.). If these dyspeptics adhere strictly to this rigorous diet, they almost always deprecate more and more in health.

A marked fear of food is distinctly observed in all these cases. This symptom I would like to designate as "sitophobia" (fear of food). If the patients give in to this sitophobia—which frequently occurs—the dyspeptic symptoms increase more and more, even after the ingestion of small quantities of liquid and predigested foods. Soon varied symptoms of inanition manifest themselves,

¹ Read December 21st, 1897, before the Section on General Medicine of the New York Academy of Medicine. Medical Record, January 1st, 1898.

² Einhorn, M.: New York Medical Record, June 24th, 1898.

such as dryness in the throat, headache and dizziness, a feeling of decided weakness, intense anaemia, sometimes even pernicious anaemia.

Should we therefore be astonished if such patients, addicted to this wrong course of living, gradually waste away and finally succumb?

Either inanition itself, or complications arising in consequence of malnutrition, may easily bring on a fatal issue. As a whole, it is rather surprising how long these patients can live in spite of insufficient nutrition. This goes to show how tenaciously the organism clings to life; it learns to economize its expenditures and to subsist on scanty means. This is the only explanation why these invalids, who, after at first losing considerably in flesh, subsequently maintain their slight bodily weight and are able to lead a meagre existence.

Gentlemen, the number of such emaciated dyspeptics is not small, and every practitioner meets with a few of them every year.

I will now present a few points by means of which these cases may be recognized.

Generally speaking, the term dyspeptic signifies one who suffers from a chronic disorder of his digestive organs, without having, however, any organic affection.

We will have to determine, first, the presence of some protracted ailment (for one or several years); second, the absence of any organic disease (ulcer, stenosis) of the stomach or intestines. An examination of the gastric contents may be omitted in these cases, although the knowledge of the chemical conditions of the gastric juice may sometimes be useful with regard to the treatment.

How shall we treat such dyspeptics? Medicaments are not of much value or play only a subordinate part. The main factor lies in proper nourishment. These patients,

who have abstained from most kinds of food for years, must now learn anew to eat. Their stomach and intestines very quickly adapt themselves to this new condition. First and above all, it is of importance to increase the quantity of nourishment; second, to provide a sufficient variety of foods. An ample but too one-sided diet (as a purely milk diet, or hot water and beef) is not suitable for a long period of time, for under this regimen there may be a partial lack of certain substances necessary for the welfare of the organism, and thus there may be exerted a deleterious action upon the economy.

In order to improve nutrition, two articles of food, which hitherto have been often avoided by laymen as well as physicians, play an important part. I mean bread and butter. In my previous paper I have already hinted at this topic; I now take the liberty of again discussing it.

Bread forms one-third of the total amount of ingested food in health, and, besides having nutritive value, serves the purpose of increasing the flow of saliva during its mastication. It also creates an appetite for other food.

Butter not only improves the taste of various kinds of food, but is also in itself a nutriment of the greatest importance. The great number of calories which butter contains (100 gm. give 837 heat units, while the same amount of bread develops about 217) shows this in the clearest manner. Another advantage which butter presents is that its volume is only about one-third that of bread. A patient taking about one-quarter of a pound of butter a day receives therewith more than one-half of the heat units required. This quantity of butter is, according to my experience, well borne by most of the patients.

I now take pleasure in presenting to you two cases, in which the main symptoms consisted principally of a de-

ficient nutrition. By improving the latter the patients got well. These two cases I take at random from a large number of a similar character.

CASE I.—Miss G. M.—, about 26 years old, suffered for the last five years continuously from marked dyspeptic symptoms. Severe gastralgia often appeared, which was frequently accompanied by vomiting. The appetite was not greatly decreased, but, fearing the pains, the patient abstained from most articles of food. Obstinate constipation was another of the troublesome symptoms present. The patient ran down very fast. She was treated by several eminent physicians, and as a last resort the ovaries were removed. Her ailments, however, persisted, and she steadily grew worse. When she first consulted me she reported that she had lost sixty pounds in weight. The patient was abed the greater part of the time, and lived exclusively on small amounts of peptonized milk and Wyeth's beef-juice.

A thorough examination of the patient did not reveal any organic disease of the digestive apparatus. A condition of enteroptosis was found, but this was not considered important. The patient was ordered to take more nourishment. She was placed (during the first week) on a fluid and semifluid diet; soon, however, the bill of fare was increased, and after about three or four weeks she partook of nearly all the plain and ordinary articles of food. During the first fortnight the patient continued to complain of manifold severe symptoms after meals, but soon her complaints grew less frequent and after a while entirely ceased. The patient was plentifully nourished in a methodical way (among other directions she was told to take one-quarter of a pound of butter a day), and she gained fifty pounds in weight in a period of five months. After that time she could

be regarded as restored to perfect health. She could take long walks without fatigue, she rode a wheel, and attended to all her household duties.

CASE II.—Mrs. Caroline A—, 65 years old, had suffered for the last four years, off and on, from dyspeptic symptoms. During the last five or six months her condition grew materially worse. The patient usually had severe pains after meals, and suffered from obstinate constipation, weakness, and insomnia. During this entire time she had been on a rigorous diet (beef-juice, etc.), and had been treated with various medicaments; but under this treatment she had lost thirty-five pounds in weight. The physician in charge and also her relatives were of the opinion that she had a cancer. A thorough examination revealed only a downward displacement of the liver and stomach. The liver at first simulated a tumor, but on further examination it could be easily seen that the latter was the prolapsed liver and not a neoplasm.

The patient was told to partake of nourishment every three hours and was allowed certain articles of food which had been previously forbidden. At first zwieback, crackers, and gruels were permitted, besides a small quantity of scraped beef. Soon, however, the ordinary white bread, butter, eggs, and similar substances were added, and the patient began to gain in strength. (The wearing of an abdominal bandage was not advised, as the patient did not feel relieved when the lower part of her abdomen was supported with the hands when she was examined.) During a period of three weeks the patient gained eight pounds in weight, got rid of her dizzy spells, as well as her gastralgia, and could sleep much more comfortably. She is still under treatment, but her convalescence continues.

As nutrition plays the principal part in the treatment of these patients, it will not be amiss to give a few hints with regard to its management. To begin with, it does not appear advisable to permit patients who have abstained for a long while from the coarser varieties of food everything at once. This abrupt change may at times be the cause of various unpleasant symptoms; therefore it should be accomplished gradually. At first give, besides milk, gruels, and thickened soups, eggs beaten up in milk, etc. A few days later begin to add to this bill of fare zwieback or crackers with butter; then permit meat, the white of chicken and well-scraped beef; next, mashed potatoes; still later give wheaten bread, baked or boiled potatoes, soft-boiled or scrambled eggs, oysters; at last allow vegetables and fruits.

An essential point with regard to nutrition is punctuality in the taking of meals. In most of these cases, in which a gain in weight is of great importance, frequent meals (five or six daily) will be advisable. Although it does not appear advantageous to prescribe for the patient the quantities of the various foods in exact weight (grams or ounces)—as by so doing they are too easily reminded of their ability or inability to digest this or that quantity and not more—it is nevertheless of value to mention approximate figures by which they may be guided or below which they shall not go. Thus, for example, they may be told to eat as much as their neighbors at table, or that they shall take ten ounces of milk at this or that meal; or, as I frequently advise, that they shall consume one-quarter of a pound of butter a day. Emphasize those points which appear to be the most important, and leave the patient great liberty in all other particulars. We must strive to familiarize the patient with the idea that ample nourishment will strengthen his organs (in-

cluding the stomach and intestines), and we must always endeavor to dispel the fear of food with which he is harassed.

For patients who are greatly run down and are confined to bed a nurse is advisable, who shall see that the physician's orders (with regard to food) are promptly carried out. Massage may certainly be used on and off as an adjuvant. For patients who are up and about, a nurse is unnecessary. In the latter instance it is important to see that the patient's time is properly occupied; by that I mean to say that the patients should lead a rational mode of living, and should work neither too much nor too little. With some patients (wealthy people, having no vocation) we must try to give them something to do; while in the case of merchants whose business strain is too great, lawyers, and physicians, we should advise that sufficient leisure be taken. The points just mentioned serve in a high degree to render possible a healthy nutrition, for only a rational mode of living gives sufficient appetite for abundant food.

In cases in which the condition of the gastric juice is known there are still other special rules with regard to diet; for, as is well known to you, we should give abundant quantities of meat in hyperchlorhydria, while in hypochlorhydria and achylia gastrica the starchy substances (and vegetable food) should predominate.

The above suggestions, however, play the principal part in the treatment, and good results may be obtained often enough without analyzing the gastric contents.

Gentlemen, I have endeavored to give in this paper a few practical hints with regard to the nourishment of most patients afflicted with chronic stomach troubles.

If I have succeeded in convincing you that it is much more important to take care that such patients are sensibly nourished than to forbid them everything, I shall feel that my object has been accomplished.

IV.

SITOPHOBIA OF ENTERIC ORIGIN.¹

SITOPHOBIA, meaning fear of food, is a condition which may last a long period of time and, if not successfully treated, may endanger life. It is therefore natural that this subject should command the full attention of the practitioner.

When I first used the term sitophobia I was not aware that Guislain² had already employed the same word to designate the refusal of food which is so often encountered in cases of melancholia and in the insane. For this condition, however, the word introduced by Sollier,³ namely, "sitieirgy," meaning refusing food, seems to be more appropriate. For, in the insane, the patients do not want to eat, not because they are afraid of the food, but for different reasons; either they are in a state of depression, unwilling to do anything, even eating, or they have suicidal ideas, or they have illusions that the food may be poisoned, etc. I may be, therefore, permitted to reserve the term sitophobia for those conditions only in which there is distinct fear of taking food on account of resultant bad consequences. Sitophobia in this

¹ Read before the New York Academy of Medicine, May 16th, 1901. Journal of the American Medical Association, June 15th, 1901.

² Guislain: Eulenburg's "Realencyclopädie der Medicin," 1887, Bd. xii., p. 696.

³ Sollier: Revue de Médecine, août, 1891.

sense has nothing to do with the insane and is found in mentally perfectly sound people.

In my paper, "The Diet of Dyspeptics,"¹ I have already alluded to the importance of sitophobia and its management.

While, however, in the above article sitophobia is spoken of as occurring in cases of disorders of the stomach, principally those accompanied by pains, of late I had the opportunity to observe the same condition in persons who had no gastric symptoms whatever and in whom "the fear of food" was due to some intestinal difficulty. I shall, therefore, in this paper speak of the latter group of cases, or of "sitophobia of enteric origin."

A good illustration of the importance of this condition will be found in the following case, which I beg to describe:

William H——, 28 years old, bookkeeper, had always been well up to two and a quarter years ago. At that time he became constipated, which condition gradually grew worse, occasionally alternating with diarrhoea. Off and on, mucus was observed in the stool. His appetite was good, but he suffered at times from headaches and disturbed sleep. Patient consulted me for the first time in March, 1900, and was given magnesia usta in conjunction with ferratin and olive-oil enemas, after which he improved for awhile. He went to the country, where his condition again became worse. On his return to the city, in August, patient was given podophyllin pills, which, however, did him no good. He then went to another physician, who ordered some medicine and injections of water.

These remedies not proving of benefit, patient again resorted to the podophyllin pills and injections every

¹ Max Einhorn: Medical Record, January 1st, 1898.

day, using both these means from September, 1900, to March, 1901. Often he would go without a movement of the bowels for seven to ten days. During all this time he ate much less than he was previously accustomed to, because he was afraid "that he would get entanglement of the bowel." His weight steadily grew less, and dropped from 138 to 101½ pounds. He became exceedingly nervous, irritable, and hypochondriacal. Of late he felt so weak that he had to abandon his vocation. At this time (March, 1901) he again consulted me, looking very badly, and being hardly able to walk. After undressing he looked almost like a skeleton, every bone being visible, not unlike a Roentgen picture.

On examination, besides this extreme condition of emaciation, pronounced anaemia was found. The thoracic organs did not present anything abnormal, while the abdominal cavity appeared somewhat caved in (almost trough-like) and showed an "apparent tumor," situated above the navel to the left of the spine. There were no areas painful to pressure. The urine contained neither sugar nor albumin. The knee reflex was present.

The diagnosis of emaciation due to inanition without any organic trouble was made and the patient treated accordingly. He was advised to eat six times a day; a rectal injection of a half-pint of warm olive oil was ordered every night, and he was given internally calcined magnesia and ferratin. He was told to eat plain, wholesome food, plenty of fruit, bread, and at least a quarter of a pound of butter daily. He immediately improved; his bowels became regular, and hardly a month later he weighed 128½ pounds, having gained on an average almost a pound every day. He now looks the picture of health, has ruddy cheeks, feels strong, and is able to take long walks without any fatigue.

Another case not unlike the one just described is the following:

Joseph W——, 23 years old, ladies' tailor, had been suffering for the last two years with digestive disturbances (fullness after eating and constipation). Six months ago he consulted me, complaining principally of severe constipation. He was given tincture of rhubarb, but his condition did not seem to improve much. The appetite was not especially good and the constipation became more obstinate. He was afraid to eat much, as he believed the more he ate the more he would be constipated and the sooner he would have to resort to a cathartic. He ate everything, but only in small quantities. He was also compelled to take a glassful of whiskey in the morning on an empty stomach and two to three times during the day in order to be able to do his work. He gradually became weaker, and lately lost fifteen pounds. His weight now is 110 pounds.

On examination, patient is found to be emaciated and pale. The thoracic as well as the abdominal organs do not reveal anything abnormal. The tongue is not coated. Urine contains neither albumin nor sugar. Patellar reflexes are present.

The diagnosis of habitual constipation with sitophobia was made and the patient treated accordingly.

In the two cases above detailed the sitophobia developed as a sequel to obstinate constipation. The patients were afraid to tax the intestinal tract with much food, as it was apparently unable to dispose of even small quantities of the most delicate aliments.

I have, however, seen instances in which chronic diarrhoea also gave rise to sitophobia. Of the many cases I have observed I will report only one.

Mrs. N. O——, about 33 years old, had been com-

plaining for the last four or five years of great flatulency and diarrhoea. She had four to six movements daily and one or two during the night—about 3 or 5 A.M. The dejecta were either watery or mushy, and always contained a considerable amount of mucus. Before an evacuation took place there was always a great deal of rumbling in the bowels, accompanied by slight colicky pains and passing of flatus. Her appetite was fair and there was no discomfort after meals. Patient, however, was very careful in her diet, taking principally mutton broth, scraped beef, and toasted bread, and of these very small quantities. She was afraid of aggravating her trouble by partaking of more food. Patient had constantly lost in flesh in the last two years, altogether about forty pounds. She feels weak, complains a great deal of dizziness, a dry sensation in her mouth, and restless sleep, and is unable to attend to her household duties.

The physical examination shows that a condition of enteroptosis prevails. The gastric contents do not reveal anything abnormal. The fecal matter contains some mucus and a considerable quantity of undigested food.

The diagnosis of enteroptosis and chronic enteritis is made. Patient is put on a liberal diet—salads, fruits, and coarse vegetables excepted—she is permitted to eat everything. She is also instructed to partake of kumyss, and bread and butter between meals. Besides the diet, patient is given tannigen (seven and a half grains three times a day). Under this régime she has steadily improved, gained considerably in weight, and her bowel trouble has yielded to a great extent, although it has not entirely disappeared.

Remarks.—In the observations just narrated the sitophobia was marked and had its origin in the belief that the bowel trouble might become aggravated by partaking

of nourishment to some extent. Nor are these cases rare. Sitophobia of a moderate degree is almost an every-day occurrence in various intestinal disorders.

Having emphasized the fact that sitophobia is met with in enteric affections, it does not appear superfluous to describe its dangers and also its treatment.

While in conditions accompanied by diarrhoea the avoidance of food may for a short while exert a beneficial influence upon the intestinal affection, it is quite different in most cases of habitual constipation. The latter condition becomes the more aggravated the less food is taken. The constipation growing more pronounced, the patient is still more afraid to partake even of the small quantities of food which he has hitherto managed to enjoy. Thus there is a circulus vitiosus: constipation causing sitophobia, which of itself aggravates the former affection.

But even in diarrhoea, with sitophobia causing an insufficient quantity of food to be ingested, there is, after a short interval of apparent improvement, a relapse. The deficient nutrition leads ultimately to an undermining of the constitution. The natural resources for combating disease are weakened; nervous symptoms manifest themselves. Thus the diarrhoea quite soon is again as bad as ever.

Moreover, sitophobia, no matter what be its cause, if left to itself is bound to endanger life. A person who habitually is taking an insufficient quantity of nourishment is slowly starving, and if there be no change in the mode of living, starving to death.

It is hardly necessary to dwell upon the symptoms which appear in this state of subnutrition. They are a host and hardly need any comment: general anaemia, and then anaemia of the brain, dizziness, dryness in the

throat, extreme fatigue, insomnia, etc. Occasionally I have met with albuminuria, which promptly disappeared upon improving the nutrition.

Another important feature of sitophobia is the habit which the patient develops of eating minute portions. The condition which has led to sitophobia may have been remedied and thus the sitophobia as such may not exist any longer, still the acquired habit of eating very little may persist. This certainly can produce the same dangers to life as the original sitophobia.

Treatment.—The patient must be made to eat sufficient quantities of food, no matter what is the underlying condition causing the sitophobia, and no matter how this is done. Sometimes persuasion alone is sufficient. Occasionally in very pronounced cases of subnutrition an ample diet cannot be adopted at once, but must be arranged gradually, accustoming the patient to more nourishment step by step. In some instances various medicaments will be helpful in carrying out this plan; thus the bromides in nervous conditions, or codeine in painful affections. Sufficient nutrition is the foundation upon which to build the structure of health. The former lacking, no matter what treatment may be instituted, the structure will sooner or later collapse. If a solid foundation is laid by a sufficient diet, it is often quite easy to achieve perfect recovery, for the usual means of treatment will then prove successful in eradicating the primary disease.

V.

SITOPHOBIA AND INANITION, AND THEIR TREATMENT.¹

BY his studies in alimentotherapy, which owes its introduction to his efforts, von Leyden has achieved immortal fame in medicine. The same may be said of S. Weir Mitchell, who at an earlier date published his well-known food and rest cure in the treatment of neurasthenia. Von Noorden followed with classical monographs on diseases of metabolism, showing that an adequate nutrition is of the greatest importance in the treatment of chronic affections. Many clinicians, including myself, followed in the footsteps of the above authors. In 1893 I wrote an article entitled "Dietetics in Diseases of the Stomach,"² and later another, "The Diet of Dyspeptics,"³ in which I emphasized that sufficient nutrition and frequently, in fact, overnutrition were essential in the cure of a great many invalids.

This proposition at first sight seems so self-evident that a discussion of this subject would hardly be considered necessary. In reality, however, even physicians frequently sin against this fundamental truth of dietetics—

¹ Read before the American Gastroenterological Association, May 14th, 1903, at Washington, D. C. The American Journal of the Medical Sciences, August, 1903.

² Medical Record, June 24th, 1893.

³ *Ibid.*, January 1st, 1898.

i.e., sufficient alimentation. I have, therefore, thought it worth while to report on this subject from an extensive clinical experience, in order to illustrate the great importance of dietetics and its application.

1. By the term **sitophobia** we understand a condition in which too little food is taken on account of fear. This fear relates to pains or disagreeable sensations in the digestive apparatus arising after meals. To avoid these, patients prefer not to eat, or rather to eat as little as possible. Sitophobia is most common in chronic affections of the digestive system, accompanied by pains (gastralgie and enteralgia). These are usually ascribed by the patient to various foods, and, in order to avoid the pains, they exclude at first the coarser and later even easily digestible articles from their dietary, taking finally only small quantities of milk or broths. Sometimes sitophobia arises in consequence of an abnormal sensibility of the gastric mucous membrane (hyperæsthesia ventriculi). This is but another variety of the cases just described; for even if in hyperæsthesia of the stomach no severe pains are experienced, yet the ingestion of food causes disagreeable sensations which the patient is anxious to avoid.

A further group is formed by those cases in which patients from false ideas, in the absence of pain, avoid food or limit its amount. Thus especially sufferers from intestinal disorders,¹ afflicted with constipation or diarrhoea, are afraid to eat heartily, because they think that the condition would be aggravated. To this class also belong all cases in which the patient for some reason or other on account of a certain ailment eats too little in quantity or variety, as, for instance, gouty people avoid-

¹ "Sitophobia of Enteric Origin." Journal of the American Medical Association, June 15th, 1901.

ing all meats, obese persons who do not take fats or carbohydrates, thereby injuring the organism.

R. von Hoesslin¹ regards sitophobia as a psychical condition. He says: "Such fears are not possible in perfectly normal people; for the expression 'phobia' presupposes the existence of an abnormal fear, based upon false ideas. If this fear is not abnormal, but justifiable—if, for instance, a patient suffering from acute enteritis is afraid to eat cabbage or prunes, or if a person who is always affected with urticaria after partaking of strawberries or lobster avoids these dishes—then we do not have to deal with a so-called phobia, but with a very sensible train of reasoning; but if this fear is abnormal, some psychic change has taken place. Sitophobia is, therefore, like all other phobias, of cerebral origin."

With reference to these remarks of von Hoesslin, I would reply that sitophobia is certainly found in people who do not suffer from any psychic disturbance. The patients are afraid to eat because they have pain afterward. This fear is justifiable; but in order to effect a cure it must be overcome, and, therefore, the treatment of this symptom (sitophobia) plays an important part.

Sitophobia, if left alone, leads to a partial, sometimes nearly total, inanition. A consideration of these conditions is, therefore, not out of place here.

2. **Inanition** means loss of strength owing to deficient nutrition. This expression was first used by Chossat² to designate the atrophy resulting from total abstinence. According to Samuel,³ we must distinguish between complete and incomplete inanition.

¹ "Bemerkungen zu Dr. Max Einhorn's Artikel über Sitophobia intestinalen Ursprungs," Zeitschr. f. diätetische u. physikalische Therapie, 1902, Bd. v., p. 529.

² "Recherches expérimentales sur l'inanition," 1885.

³ Eulenburg's "Encycl. der Med.," Bd. x., p. 320.

Complete inanition of short duration (twelve to twenty-four hours) is often noted, as, for instance, in travellers who do not find an opportunity to obtain food during a voyage; also on fast days that are observed by many persons for religious reasons.

Signs of weakness and various nervous symptoms (pains in the neck, severe headaches, vertigo) develop early and are especially marked after severe exertions. Prolonged periods of fasting are undergone either by shipwrecked people or by special professional fasters. The latter have been made the subject of important scientific investigations during the last twenty to thirty years. Our knowledge of metabolism during inanition is now almost complete, thanks to the labors of Zuntz and Lehmann,¹ Luciani,² and others.

It has been shown that during complete inanition the organism takes up as much oxygen as during normal rest —*i.e.*, after digestion is completed—for during the latter state an increased amount of oxygen is utilized, owing to the augmented activity of the digestive apparatus. During inanition the body consumes its own substance in order to maintain its temperature and its chief functions. It lives on its own flesh and fat and does not economize any more than normally.

According to von Noorden,³ the body during total abstinence burns up about 1 gm. of albumin and 3.5 gm. of fat per day and kilo of bodily weight.

Samuel describes the symptoms of complete inanition as follows: "The feeling of hunger is most intense after twenty hours, and disappears after that; the feeling of

¹ "Bericht über die Ergebnisse des an Cetti ausgeführten Hungerversuches." Berl. klin. Wochenschr., 1887, p. 42.

² "Das Hungern," 1890.

³ Berl. Klinik, 1893, Heft 55, p. 1.

thirst, however, remains until death. The mucous membranes become dry; weariness, weakness, and faintness are pronounced. The loss of weight is continuous. The mental faculties remain clear until the last. Sub finem *vitæ* albumin and mucin appear in the urine. The temperature sinks to 30° C. during the last twenty-four hours, and death occurs amid extreme prostration, deep coma, at times delirium and convulsions. During absolute abstinence death supervenes between the twelfth and twentieth days. If water is taken, life may be sustained for forty to seventy days. Forty per cent of the bodily weight is usually lost before death."

Incomplete inanition or subnutrition is frequently met with. In relatively few cases we have to deal with conditions in which the organism is unable to utilize larger amounts of food (carcinoma cardiaæ, seu ventriculi, seu pylori—extreme degrees of benign stenosis of the pylorus, infectious diseases during the febrile period). In most cases of subnutrition, however, we have to deal with conditions in which the organism would be perfectly capable of utilizing food if it were supplied to it. These are, therefore, conditions in which amelioration is possible.

Subnutrition begins as soon as the usual amount of food is diminished. The daily physiological quantity of food is about 100 to 130 gm. of albumin, 70 to 120 gm. of fat, 350 to 400 gm. of carbohydrates, 2,500 to 3,000 gm. of water, and 14 to 32 gm. of inorganic salts. Besides we inhale 744 gm. of air. The total amount of new material that is daily ingested is about 4 kilos, or about one-fifteenth of the total bodily weight. Expressed in calories, the body needs daily for each kilo about 35 to 40 calories during rest and 40 to 50 during hard work. If less food is taken an incomplete inanition

results, which manifests itself by anaemia and loss of weight. Incomplete inanition, qualitatively—as, for instance, total abstinence from water, even such as occurs in solid food—leads, according to Samuel, to death just as quickly as complete inanition. On a purely albuminous diet the body fat disappears, and on a diet consisting of fats or carbohydrates alone the bodily albumin diminishes. A diet deficient in salts is badly borne. Digestive disturbances arise and nervous symptoms (trembling, muscular weakness) and death follow.

In practice we meet less often with a one-sided subnutrition (one deficient in a qualitative way) than with general subnutrition. The latter is encountered in the greater number of dyspeptics. I would like to cite here some examples from my practice as I meet them every week—in fact, almost daily—in order to show how much less food dyspeptics take than the physiologically required quantity:

CASE I. (March 15th, 1903).—Mrs. Sadie M—, aged 38 years, complains for the last six years of pains about half an hour after meals, and much belching. She weighed formerly 168 pounds, and has decreased to 100 pounds in five years. She feels weak, without energy, sleeps poorly, and has pains after meals. She fears to eat on account of pain. During the last four months she has lived as follows:

	Calories.
8 A.M. One cup of milk (200 c.c.)	128
One slice of stale bread (30 gm.) without butter.....	64
12 M. One-quarter pound of steak	125
One potato (25 gm.)	22
Occasionally a half slice of stale bread.....	32
5 P.M. One-eighth pound of steak	62
Two slices of stale bread	128
	<hr/> 561

The patient took daily $12\frac{1}{2}$ calories per kilo weight.

CASE II. (September 24th, 1902).—Mrs. F. H.—, aged 38 years, has complained for two years of a feeling of constriction in the upper abdominal region. Appetite was increased, bowels were regular. During the last year she has lost 25 pounds (weighing originally 120 pounds and going down to 95 pounds).

She felt very weak, being hardly able to walk upstairs. During the last year the bill of fare of the patient was as follows:

	Calories.
8 A.M. One chop (30 gm.).....	37
Thin slice of bread (30 gm.).....	64
Some butter (5 gm.).....	42
One cup of coffee with very little milk (30 c.c.).....	20
10 A.M. One cup of broth (200 c.c.).....	10
12 M. Meat (100 gm.).....	213
Potatoes (50 gm.).....	63
String beans (30 gm.).....	100
No bread.	
3 P.M. Cup of coffee with a teaspoonful of milk	3
One slice of bread (30 gm.).....	64
7 P.M. Steak (100 gm.).....	213
One slice of bread (30 gm.).....	64
A little butter (5 gm.).....	42
10 P.M. Claret and one cracker (10 gm.).....	35
	<hr/>
	970

The patient was therefore taking food of a nutritive value of $22\frac{1}{2}$ calories per kilo daily.

CASE III. (March 6th, 1903).—Lena F.— began to suffer a year ago from pains in the stomach, occurring one hour after meals. She was told by a physician to fast six days—*i.e.*, not to take anything at all at first and later only a little liquid food. She did this and was reduced from 100 pounds to 80 pounds. Afterward she slowly recovered and felt quite well for several months; she gained in flesh so that she weighed 104 pounds.

About four months ago the patient began again to experience pain in the stomach after meals; she ascribed this to various articles of food, and gradually eliminated one after the other from her dietary. She steadily lost in flesh and weighed but 89 pounds when she first consulted me. Her diet then was as follows:

	Calories.
8 A.M. One slice of toast (30 gm.).....	64
One cup of milk (200 c.c.).....	128
10 A.M. One cup of beef-tea (200 c.c.).....	13
12 M. One plate of soup (200 c.c.) with rice (30 gm.) or barley.....	100
One thin slice of bread (30 gm.).....	64
One ounce of scraped beef.....	30
3 P.M. One cup of milk (200 c.c.).....	128
Two crackers (20 gm.)	70
Some butter (5 gm.)	42
6 P.M. Beef-tea (200 c.c.)	13
One slice of bread (30 gm.).....	64
Scraped beef (30 gm.)	30
One saucer of farina (100 gm.)	182
10 P.M. One cup of malted milk (200 gm.).....	128
	<hr/> 1,056

As patient weighed 89 pounds, she was taking on an average a daily amount of 26.4 calories per kilo.

These three cases suffice in order to show how gravely the nutrition of the organism must suffer if for long periods on an average only about two-thirds (sometimes even one-third) of the food necessary to maintain the equilibrium is taken. If we study the above figures nobody will be surprised that such patients steadily decline and complain of weakness and various nervous disturbances. What is rather to be wondered at is the fact that such patients linger so long in their miserable condition and do not succumb sooner.

Treatment.—In complete inanition lasting twenty-four hours or longer, the treatment consists in carefully administering easily digestible fluid or semifluid food in not too large amounts. It is quite natural that the famished are inclined to devour greedily any food that is accessible. If, however, they take too much or too coarse food it readily causes serious trouble in the exhausted intestinal tract. The chief duty of the physician, therefore, consists in proceeding with caution and restriction with regard to the taking of food during the first few meals. If after eating the exhaustion of the patient has disappeared, he may then return to his usual mode of life.

The treatment of incomplete inanition or subnutrition is altogether different. Here we must first combat sitophobia, if it exists, because otherwise the existing malnutrition can hardly be removed. It is important to encourage the patient to eat in spite of the pain. Usually the latter is in reality not so severe, and in nearly all cases we will succeed after a while in banishing the fear of food. Soon the patient can take ordinary nourishment. Even articles of diet which formerly caused severe pain are now tolerated without difficulty. The stomach, or rather the intestinal tract, seems to accustom itself to the greater demands made upon it.

It is, of course, advisable in some cases at the beginning of the treatment to diminish the sensitiveness of the digestive apparatus by bromides or similar drugs. These medicines are, however, not essential, but rather bridge over the first few days by facilitating the carrying out of the directions in regard to eating.

Another point of great importance is to improve the nutrition of the patient. At first we have to see that the patients take as much food as is necessary to maintain

their equilibrium, and that no loss of weight occurs. This alone, however, is not sufficient for a complete cure; for many of these patients are very much run down, and, while they will not lose any more weight with an amount of food that is just sufficient for their needs, they will, however, remain in their weakened condition. It is, therefore, very important that an increased quantity of food should be given, in order to make the patient gain in weight.

At first sight the accomplishment of this seems hardly possible. In reality, however, it is not so difficult, and can easily be done in most dyspeptic conditions (except carcinoma of the stomach and bowel).

In laying out a plan of alimentation the following points should be considered: The first change in diet must not be too great. If we have to deal with patients who have lived for a long time on fluid food only, it is best to begin with liquid or semisolid food, as, for instance, milk, beef-tea, raw eggs beaten up in milk, or broths, strained barley or oatmeal soups, gruels, and jellies. We must, however, see that a sufficient quantity of nourishment is taken. This light transitional diet should be increased daily by some article or other approaching more nearly to the ordinary bill of fare. At first soft-boiled eggs, zwieback, tender meat, mashed potatoes, white bread, butter; later, light vegetables, boiled fruits, etc., are added.

As soon as the patients partake of the usual articles of food they should be instructed to eat about as much as their neighbors at table, only taking more butter (at first one-eighth, later one-quarter pound daily), and taking a glassful of milk and a slice of buttered bread regularly between meals. With a diet like this we succeed nearly always in obtaining an increase in weight.

Thus in all the three cases mentioned above, which have been picked out at random from my journal, the patients gained even in the first few weeks after beginning this regimen.

The first case (Mrs. Sadie M——) gained two pounds the first week; the second (Mrs. F. H——) fifteen pounds in five months after the beginning of the treatment; the third case (Mrs. Lena F——) gained three pounds in the first three weeks, and eight pounds in seven weeks after commencing treatment.

The increase in weight, of course, continues as long as this excessive amount of food is taken. At the same time we find a general increase in bodily strength, so that patients who were invalids for a long time and a burden to their families and themselves could again resume their work and become useful members of society.

Simultaneously with this strengthening of the body the original complaints, usually not due to organic lesions, can be at the same time removed by medical skill. Alimentotherapy, therefore, in these cases is the fundamental of complete recovery.

VI.

THE ART OF INCREASING AND DIMINISHING THE BODILY WEIGHT AT WILL.¹

THE physician is frequently confronted with the problem of modifying the bodily weight in one or the other direction. Many chronic maladies are accompanied by considerable loss of weight, and in their enfeebled state the patients are greatly hampered in their battle against disease. If, however, we succeed in putting them into a better general condition, then they are enabled vigorously to combat their troubles. To obtain an increase in weight is therefore here of primary importance.

An excessive bodily weight also leads to disagreeable conditions, occasionally even to disease. Accumulations of fat around the heart and intestines impede the action of these organs. The ponderous body is sometimes too heavy for the legs; laziness results, leading occasionally to fatty degeneration of important muscles, including the heart. In all these cases a reduction of bodily weight must be sought.

It does not appear superfluous, therefore, to discuss the question how to change the bodily weight in one or the other direction.

I. The principles governing these problems are intimately connected with the physiology of metabolism and must first be briefly considered.

¹ Read at the annual meeting of the Monroe County Medical Society, at Rochester, N. Y., May 27th, 1903. Medical Record, July 18th, 1903.

The Revenues and Expenditures of the Body.—In the life of every being there is a constant exchange of revenues and expenditures. The revenues of the body consist, as we all know, of food and air; the expenditures, of the generation of bodily heat necessary for life and of the work performed (heart action, respiration, glandular activity, muscular work in general).

The value of food is measured by its caloric energy. Heat may be transformed into power and the latter into the former. The mechanical equivalent of one calorie = 425.5 kgm. If the work performed (expressed in kilogrammeters) is known it can be calculated according to the above formula in calories, *i.e.*, we can tell exactly how much heat is consumed in the work accomplished. The human organism, however, is not able to convert the entire number of heat units into work. According to Von Noorden,¹ the organism requires for a certain amount of work about four times the amount of potential energy; in other words, seventy-five per cent of the calories, changed into power, are given off in the form of heat which radiates from the body and is thus lost.

A person performing about 4,000 kgm. work uses, therefore, $\frac{4,000}{425.5} \times 4 = 37.6$ calories.

The amount of food for the adult per day has been calculated at about 2,600 calories.

Body Equilibrium.—If the amount of food taken is just sufficient for all demands of the body we have a balancing of bodily weight or bodily equilibrium, *i.e.*, the organism neither loses nor gains in weight.

What Happens When More or Less Food is Taken?—Formerly the view prevailed that the more food is sup-

¹ C. v. Noorden: "Lehrbuch der Pathologie des Stoffwechsels," Berlin, 1893.

plied to the animal organism the more material it burns up. As a proof of this theory, the fact was adduced that a short time after eating the consumption of oxygen and the elimination of carbonic acid gas were found to be increased. Speck¹ proved, however, that the increased consumption of oxygen was to be ascribed to the increased activity of the digestive glands, and therefore the theory of augmented combustion of increased nutritive material had to be abandoned. There are numerous proofs that the organism does not burn up food introduced in excess, but rather utilizes it and converts it into fat.

On the other hand, the organism consumes just as much material even when no food is taken, using up its own substance (fat and muscles). In acute inanition the adult usually expends about 2,100 calories; in protracted inanition somewhat less, about 1,700 to 1,900 calories per day. The loss of nitrogen of a healthy fasting man is about 10 to 11 gm. daily.

Work and Rest.—With increased muscular work the expenditure is much larger, as is evident from the above. Lavoisier was the first to recognize this important law. Zuntz² has distinguished himself in this field by many important investigations. This celebrated savant has determined the following values for the calories expended in the occupations of ordinary life:

“Walking on a level road requires between 0.5–0.6 calories per kilogram and per 1,000 metres, according to

¹ Speck: “Experimentelle Untersuchungen über den Einfluss der Nahrung auf Sauerstoffverbrauch und Kohlensäureausscheidung.” Archiv für Experimentelle Pathologie und Pharmacie, ii., p. 412, 1874.

² Zuntz: “Bemerkungen zur therapeutischen Verwertung der Muskelthätigkeit.” Zeitschrift für diätetische und physikalische Therapie, Bd. v., p. 101.

the degree of skill in walking¹ of the individual. A man weighing 80 kgm., and travelling 75 meters per minute, would therefore use for every 1,000 metres walked about $80 \times 0.55 = 44$ calories, or 3.3 calories every minute, this being about two and one-half times as much as during absolute rest. If there is a ten-per-cent grade in the road the total amount per 1,000 metres is $44 + 60 = 104$ calories, or $\frac{104 \times 75}{1,000} = 7.8$ calories per minute, 468 calories per hour; this is about the limit of what a strong man is able to perform for any length of time.

"On accelerating the gait the consumption increases about 0.0024 calories per 1,000 metres for every metre of increased rapidity between 60-100 metres per minute, above 100 metres in increased ratio.

"In wheeling, according to Leo Zuntz, the hourly increase of consumption over that of absolute rest for a man weighing 70 kgm. is as follows:

	Calories
Going 9 km. per hour	183
Going 15 km. per hour	313
Going 22 km. per hour	571
Going 9 km. per hour, three per cent grade	316
Going 15 km. per hour, and headwind of a velocity of 10 metres per second	601

If, for instance, an adult should traverse four English miles (6,436 metres), he would consume $\frac{6,436 \times 44}{1,000} = 283$ calories.

With increased work, under the same diet, a person in a state of physiological equilibrium must lose in weight;

¹ Every mechanical impediment, every tenderness in muscles, tendons, or joints, like disturbances of coördination (beginning tabes), increases considerably the calorie consumption in walking.

the increased consumption of calories is supplied from the body tissue. On the other hand, under the same conditions (*i.e.*, ingestion of the same amount of food), but with marked diminution of the usual amount of work (rest in bed), an increase of bodily weight must follow.

Expressed in other words, this means that the body normally does not lose any of the food introduced (after deduction of the usual not utilized residue, which almost always represents a constant percentage), and converts all ingested material into energy (heat or power) or into tissues. In the same manner, every effort of the organism (heat, energy) must be compensated for by calorigenic material, no matter whether it be furnished by the food or by the body itself (in case of abstinence from food).

After these digressions in the realm of physiology let us return to our subject:

II. **An increase of bodily weight** is often desirable in conditions of emaciation and leanness.

Leanness is met with, although rarely, in persons who are perfectly healthy. These are usually individuals of a vivacious temperament doing a great deal of work and eating only moderately. Such persons are apt to remain lean, and may reach an advanced old age without gaining or losing.

It is quite different with those frequently occurring cases of **emaciation**. The latter accompanies chronic diseases of various nature, and usually progresses steadily. These patients lead a miserable life, and are usually unable to resist any intercurrent disease, and, though they may live some years, hardly ever reach old age. In the majority of instances they fade away much earlier.

In emaciation, as is evident, it is imperative to counteract it—this, in fact, constituting the main object of treatment. But also the leanness of the healthy, if it is of a high degree, ought to be combated. For these persons are at a great disadvantage as compared with normal people. They have no reserve fat on which they can fall back in time of need. This may be fraught with fatal consequence in supervening acute febrile diseases.

Can leanness and emaciation be successfully combated? This question must be answered in the affirmative. In nearly ninety to ninety-five per cent of all the cases of leanness and emaciation (cancer, of course, excepted), in which I have made an extended trial to raise the bodily weight, I have been successful.

Increasing the Bodily Weight.—If we desire to obtain a rise in bodily weight, we must introduce into the body larger amounts of food, and especially nutriments of a high caloric value. Practically we proceed as follows: We inquire minutely how the patient has recently lived; what kind of food and how much he has taken with every meal. If we find that his diet was one-sided, we must immediately change it; for a diet list excluding many important foodstuffs is always deleterious in the long run. We will therefore permit as great a variety of food as is compatible with the condition of the case.

We then inquire as to the quantity of food ingested. Should the latter be insufficient it must be our aim to prescribe the food in somewhat larger quantities. If the normal amount is taken, we must make the beverages taken with the meals more nutritious. Coffee and tea, for instance, are given diluted one-half with milk and a small addition of cream as well as sugar, or, instead of coffee, a glass of milk is ordered.

In suitable cases two or three smaller meals, consisting of milk and buttered bread, may be given with advantage.

It is advisable to prescribe the daily amount of butter that should be taken: I usually order a quarter of a pound per day. Butter is a fat easily digested, and, on account of its high caloric value, especially suitable.

The success of treatment is practically assured, if it is possible to get the individual to take larger amounts of food. We often have to deal with persons whose appetite is very poor. Here, besides the usual remedies, we have to make use of the following dietetic means: Bread and vegetables, as well as milk and eggs, can usually be taken with relish, even if a marked antipathy for meat exists. The addition of olives, lettuce, horseradish, etc., sometimes aids in overcoming this. A glass of cold water stimulates the appetite while eating and induces a larger consumption of food. It is self-understood that we make use of all these measures, which besides their dietetic importance contribute to the patient's enjoyment of life, provided no serious contraindications are present.

Outdoor life and moderate exercise (walking, light gymnastics, bowling, etc.) are of great value. The latter stimulates the appetite, and by satisfying it the increased loss of heat through muscular work will not only be compensated, but probably an excess of food will be ingested without trouble. Exercise, furthermore, serves the purpose of stimulating muscular development and of strengthening the body.

By means of a suitable combination of food and exercise, we effect not only an increased formation of adipose, but also of muscular tissue, and a gain in strength.

III. The bodily weight should be reduced as soon as

there is a surplus of fat, which is displeasing to the eye or mars the harmony of the body.

There are two ways of diminishing the bodily weight: first, diminution of the amount of food taken; secondly, increase of the amount of work performed, or a combination of both.

Karell,¹ and after him S. Weir Mitchell,² have tried to treat obesity by a restricted milk diet. S. Weir Mitchell says: "Karell has pointed out that on a creamless milk diet fat people lose flesh.

"This can be done rapidly and with safety by the following means: The person whose weight we decide to lessen is placed on skimmed milk alone, with the usual precautions, or at once we give skimmed milk with the usual food, and in a week put aside all other diet save milk and all other fluids. When we find what quantity of milk will sustain the weight, we diminish the amount by degrees, until the patient is losing a half pound of weight each day, or less or more, as seems to be well borne. Meanwhile, during the first week or two, rest in bed is enjoined, and later, for a varying period, rest in bed or on a lounge is insisted upon, while at the same time massage is used once or twice a day, and later in the case Swedish movement. At the same time the pulse and weight are observed with care, so that if there be too rapid loss or any sign of feebleness the diet may be increased. In many such cases I allowed daily a moderate amount of beef or chicken or oyster soup—more as a relief to the unpleasantness of a milk diet than for any other reason."

Banting's cure also is based upon a reduction of the

¹ Philip Karell: "Milk in Cardiac Hypertrophy." Edinburgh Medical Journal, August, 1866.

² S. Weir Mitchell: "Fat and Blood." Philadelphia, 1884.

amount of calories introduced with the food (nearly exclusively meat diet).

Oertel¹ was the first to call attention to the value of muscular exercise in the treatment of obesity. By a gradual slow increase of work it was found possible to accustom even a weakened heart to greater exertion. Oertel, as is known, recommended for this purpose the climbing of light grades.

Zuntz² is of the same opinion, and advises in treating obesity to utilize muscular activity. In the treatment of obesity we must endeavor to free the body from superfluous fat, without impairing the amount of albuminoid substance (muscles). This can be most easily accomplished if with a moderate but sufficient diet the usual amount of work is slowly increased without augmenting the amount of food consumption. It is more difficult if at the same time that work is increased the amount of food is considerably decreased.

Practically we should proceed as follows: We must determine exactly under what dietary (this must be estimated quantitatively in an approximate manner) an individual will remain in a state of bodily equilibrium. If the person has not gained lately, we may take the amount of food that he has been in the habit of consuming as a standard. If, however, he has been gaining on this quantity, we ought to diminish it, allowing, for instance, only one slice of bread instead of two or three, leaving off intermediate meals, etc. The weight of the patient should be controlled every two or three days, or weekly, by the scales. As soon as the amount of food necessary

¹ Oertel: "Allgemeine Therapie der Kreislaufsstörungen," Leipzig, 1884

² Zuntz: "Zeitschrift für diätetische und physikalische Therapie," *loc. cit.*

to keep the body in equilibrium has been determined, we must begin slowly to increase his muscular work. He should walk one-half to three-quarters of an hour in addition to his usual work, or ride a wheel, or row or fence, or play billiards or golf, or hunt or fish. Gradually the time for exercise may be lengthened or the degree of work intensified; as, for instance, by traversing the same distance in shorter time, when walking, cycling, or rowing. This materially increases the consumption of calories. If we proceed slowly and carefully, we can soon obtain considerable work even from individuals that are weak.

In increasing the work never allow the patient to become exhausted. The accelerated heart action and respiration due to the exertion must return to normal ten minutes after beginning to rest. If this is not the case, the work must be reduced.

IV. We have seen that by means of suitable diet and muscular work the body weight may be increased or reduced at will. It is also gratifying to note that the increase or reduction of the body substance, if it is advantageous for the organism, will be distributed in a harmonious way, so as not to offend our æsthetic feelings. In a general way, we will be right if we maintain that beauty and health with regard to bodily shape go hand-in-hand. When an increase in body-weight is accompanied by increased beauty it will be found to be of hygienic value. In a similar manner, a decrease of weight bringing out a more harmonious appearance is certainly also advantageous to health.

The axiom that fat and muscular tissue are evenly distributed when an increase takes place is, however, subject to an exception in the interest of the organism. The deposition of fat is somewhat greater in places

where the subjacent muscles are not called into frequent play, whereas the muscles increase to the largest extent in such places where they are called frequently into action. In reducing weight the opposite holds good. The greatest loss in fat occurs in places where the muscles are most exercised, and the greatest loss in muscular tissue where muscular activity is small. The advantage of this arrangement is that fat is deposited in such places where it can cause the least harm, and muscles where they are of most value. In the disintegration of tissue, of course, the contrary obtains. Thus the organism watches that everything shall turn out to the best advantage, *i.e.*, it makes use of everything (work and food) for its own benefit.

It is a grateful task for the physician to intervene where in consequence of a false mode of life (too much or too little food, too much or too little work) harm may result to the organism. At the same time we must feel great satisfaction in the knowledge that through simple means (diet and muscular work) we are able to effect an improvement or a cure of the harmful conditions present.

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